Information

Long-term Results of Extracranial to Intracranial Bypass for Ischemic Vascular Disease

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MORE THAN A DECADE has passed since the first cases of extracranial to intracranial bypass in humans were reported. Since then improvement in microsurgical techniques and instruments has allowed for an array of microvascular procedures for establishing collateral flow to the brain in cases of ischemic disease. The most common of these is the superficial temporal artery to middle cerebral artery bypass. Other procedures for improving flow in the basilar circulation are being done with increasing frequency. These include occipital artery to posterior inferior cerebellar artery bypass, superficial temporal artery to superior cerebellar artery bypass and intracranial vertebral endarterectomy. Increasing experience with the surgical treatment of ischemic cerebral vascular disease should provide valuable information regarding the management of stroke and its prevention. Now that thousands of superficial temporal artery to middle cerebral artery bypasses have been done, it is important to look at current concepts as well as long-term results.

Indications for this bypass procedure continue to be ischemic lesions in the carotid circulation inaccessible to conventional extracranial vascular techniques, such as endarterectomy. The most common angiographic indication is internal carotid artery occlusion, but a large number of patients with intracranial carotid artery stenosis and middle cerebral artery stenosis and occlusion are felt to be suitable candidates.

Clinical indications include transient ischemic attacks and the presence of a reversible ischemic neurologic deficit. Certain selected patients with completed stroke, especially those with continued ischemic symptoms, are also candidates for the procedure.

Patency rates in well-selected patients continue to be more than 90%. Morbidity and mortality figures are highly acceptable and are comparable to the lowest rates associated with carotid endarterectomy. Permanent neurologic morbidity related to the operation averages 3% to 4%. Patients with a functioning extracranial-intracranial bypass have a number of the following benefits: improvement in electroencephalographic findings, increase in cerebral blood flow and cerebral metabolic rate, reduction in transient ischemic events, improvement in cerebral vasomotor activity and reversal of neurologic deficits.

Despite these well-documented salutary effects of surgically constructed collateral circulation to the brain, questions relating to long-term clinical benefits remain to be answered. Chater has recently cataloged his observations of 400 cases of superficial temporal artery to middle cerebral artery bypass. The average follow-up time was 43 months and the longest was more than ten years.[1] Overall there was a 2.5% mortality rate and a 2.2% permanent neurologic morbidity rate. More than half of the follow-up mortality in those patients was cardiac related. In patients with a functioning bypass there was a 0.9% per year stroke rate on the side of the bypass. Yonekura and co-workers[2] made similar observations in 107 cases followed for more than 25 months: 82% of their patients showed lessening of transient ischemic attacks and 70% eventually recovered from neurologic deficits. They found a 1.5% stroke rate per year in patients who had a functioning bypass. Thus there seems to be some long-term protective effect of a functioning bypass in selected patients.

Unfortunately, the above-mentioned studies suffer from the lack of a simultaneously treated control group. In hopes of answering continued questions related to long-term clinical benefits, an international multicenter randomized study initiated in 1977 should conclude and be available for scrutiny within the next year. The study, funded by the National Institute of Neurological and Communication Disorders and Stroke (NINCDS) and based in London, Ontario, will compare a group of randomly selected patients who have ischemic symptoms treated either nonsurgically or with a superficial temporal to middle cerebral artery bypass. End points are stroke and death due to stroke and should provide some valuable information regarding the long-term efficacy of this particular surgical procedure.

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